CLAIMS

What is claimed is:

1. A drive system for a mower, comprising:

SUB B1

a first wheel for propelling the mower;

a first motor mechanically connected to the first wheel such that the first motor drives the rotation of the wheel;

a generator electrically connected to the first motor such that the generator converts mechanical power into electrical power and supplies this electrical power to the first motor; and

an internal combustion engine mechanically connected to the generator such that the internal combustion engine supplies mechanical power to the generator.

2. The drive system of claim 1, wherein the first motor is a high-efficiency switched reluctance electric motor.

B

3. The drive system of claim 1, further comprising:

SUB B1

a second motor mechanically connected to a second wheel and electrically connected to the generator such that the second motor drives the rotation of the second wheel.

4. The drive system of claim 3, wherein each of the first and second motors may operate independently.

SUB B2

5. The drive system of claim 1, wherein the internal combustion engine is run continually at the speed where it is most efficient.

6. The drive system of claim 1, wherein the motors will regenerate back through the motor to apply a braking force against the internal combustion engine.

7. The drive system of claim 1, further comprising

a differential mechanically connected between the first motor and the first wheel.

8. The drive system of claim 1, further comprising:

a gearbox mechanically connected between the first motor and the first wheel.

9. The drive system of claim 8, wherein the gearbox is a speed reduction gearbox.

SUB B3

10. The drive system of claim 1, further comprising:

a power control module electrically connected to the generator, the power control module including a central computer and a generator control circuit such that

B3 Cont

the generator is controlled by the central computer through the generator control circuit.

11. The drive circuit of claim 10, wherein the central computer controls the generator output by controlling electrical excitation of the generator through the generator control circuit.

12. The drive circuit of claim 10, the generator including a generator rotor and a generator encoder placed to monitor the generator rotor, wherein the generator encoder sends a generator signal to the power control module, and the generator signal is monitored by the power control module to determine a level of excitation required in order to maintain the correct output level of the generator.

13. The drive circuit of claim 10, further comprising:

a speed set-point signal representing a desired generator speed;

a generator speed signal representing the actual speed of the generator;

a resultant generator error signal representing the difference between the speed set point signal and the generator speed signal; and

a generator control signal;

wherein the generator speed signal is algebraically summed with the speed set-point signal to form the resultant generator error signal, and the resultant generator

error signal is processed by the central computer to create the generator control signal which is sent to the generator circuit to control the excitation of the generator.

B3 Cont

14. The drive system of claim 1, further comprising:

a power control module including a central computer and a motor control circuit such that the motor is controlled by the central computer through the motor control circuit.

15. The drive system of claim 14, the motor including a motor rotor and a motor encoder placed to monitor the motor rotor, wherein the motor encoder sends a motor signal to the power control module, and the motor signal is monitored by the power control module to determine the level of excitation required in order to maintain the correct output level of the motor.

16. The drive system of claim 14, further comprising:

a speed set-point signal;

a motor speed signal;

a resultant motor error signal; and

a motor control signal;

wherein the motor speed signal is algebraically summed with the speed set-point signal to form the resultant motor error signal, and the resultant motor error

53 Cont

signal is processed by the central computer to generate the motor control signal which is sent to the motor circuit to control the excitation of the motor.

17. The drive system of claim 14, further comprising:

a speed set point signal, wherein the central computer determines the speed of the motor and to compares the speed of the motor to the speed set point signal to determine if a speed correction is required to increase or decrease the power signal to that motor.

18. The drive system of claim 17, wherein the acceleration of the motor is controlled by ramping up the speed set-point signal.

19. The drive system of claim 14, further comprising:

a current set point signal, wherein the central computer determines the current of the motor and to compares the current of the motor to the current set point to determine if a current correction is required to increase or decrease the power signal to the motor.

20. The drive system of claim 14, the power control module including:

a central computer, which accepts control signals from a steering input device;

a generator encoder providing a generator signal and a motor encoder providing a motor signal, wherein these signals are used by the central computer to control of

B3 Cont

the commutation of the phase excitation in the generator stator winding and the motor stator winding.

21. The drive system of claim 1, further comprising:

a battery used for starting the internal combustion engine

22. The drive system of claim 1, further comprising:

a belt drive system for mechanically connecting the generator and the internal combustion engine.

SUB B4

23. The drive system of claim 1, further comprising:

an inverter module connected to the generator to provide auxiliary power.

24. The drive system of claim 23, the inverter module including:

a semiconductor H-bridge for chopping the output of the generator; and

a low-pass filter for filtering the chopped generator output to provide an alternating current signal.

25. The drive system of claim 24, wherein the alternating current signal includes to components characterized as synchronous 110/120 VAC, 50/60 Hz sinewave inverter outputs that are 180 degrees out of phase.

26. The drive system of claim 25, wherein the outputs are combined to provide a 240V AC output.

Sub B37

27. The drive system of claim 23, wherein the inverter output may be inhibited when the mower is moving.

28. A control method for a drive system utilizing a first motor with a first motor current, a first motor speed, and a first motor speed control signal and a second motor with a second motor current, a second motor speed, and a second motor speed control signal, wherein the control method is used to electrically simulate the characteristics of a mechanical differential, comprising;

detecting a drop in motor current associated with a loss of traction;

matching the first motor current into the first motor with a second motor current into the second motor;

repeating the matching until the first current and the second current are substantially equal.

aligning the average speed of the first motor and the second motor with a speed set point;

repeating the aligning until the two speeds are substantially equal

measuring the current into the fastest motor.

measuring the current into the slowest motor

comparing the currents of the fastest motor and the slowest motor;

returning to the matching step if the fastest motor current is lower than the slowest motor current;

adjusting the motor speed, incrementing the current to the slowest motor, and returning to aligning only if the fastest motor current is higher than the slowest motor current.

29. The control method of claim 28, wherein matching includes:

measuring the first current into the first motor;

measuring the second current into the second motor;

comparing the first current and the second current and marking one of the motor currents as a higher current motor and the other motor current as a lower current motor;

decrementing the current of the higher current signal when the currents are not equal;

incrementing the speed of the lower current motor and equally decrementing the speed of the higher current motor;

30. The control method of claim 28, wherein aligning includes:

measuring the speed of the first motor;

measuring the speed of the second motor;

averaging the speeds of the two motors to create an average speed;

comparing the average speed to the speed set point;

matching the currents if the average speed is not equal to the speed set-point.

31. A control method for a positive traction drive system utilizing a first motor with a first motor speed, and a second motor with a second motor speed, comprising:

measuring the speed of the first motor and the second motor, and

equalizing the speed of the two motors regardless of the loss of traction by either wheel.

32. The control method of claim 31, further comprising:

detecting speeds greater than a given speed set-point; and

disabling the control method when the speeds are greater than the set point.

33. A control method for a positive traction drive system utilizing a first motor with a first motor speed, and a second motor with a second motor speed, comprising:

measuring the speed of the first motor and the second motor within an allowable difference, and

equalizing the speed of the two motors to be within the allowable difference.

34. The control method of claim 33, further comprising:

varying the allowable difference as the speed is changed.

- No gearbox (claim 8)

35. A mower comprising:

- No encoder (cl 10)

a first wheel;

a first motor drivingly connected to the first wheel;

a generator adapted to convert mechanical energy into electrical energy, the generator electrically connected to supply electrical power to the first motor;

a fuel engine operatively connected to the generator adapted to provide mechanical energy to the generator.

36. The mower of claim 35, further comprising:

a power inverter electrically connected to the generator, the power inverter adapted to convert electrical energy from the generator into standard household electrical power.

37. The mower of claim 35, wherein the mower is a lawn tractor.

38. The mower of claim 35, further comprising:

a second wheel rotationally attached to the frame;

a second motor drivingly connected to the second wheel; and

the generator electrically connected to supply electrical power to the second motor.